

In the Claims:

1. - 7. Cancelled

8. (New) In a method of affecting cleaning to remove  $\text{AlF}_3$  residue from walls of a reactor chamber, the method comprising the steps of:

a) identifying process conditions that maximize H-atom concentration in a plasma of a gas mixture containing  $\text{H}_2$  and Ar using optical emission spectroscopy to identify the H atom concentration in the plasma based on the relative emission intensity from excited H and Ar atoms by the formula:

$$\frac{\text{intensity of H}}{\text{intensity of Ar}} \sim \text{H atom concentration.}$$

b) subjecting said reactor chamber in situ to  $\text{H}_2$  gas or a gas mixture of He/ $\text{H}_2$  according to the process conditions identified in step a) without opening said chamber and without shutting down said chamber to affect reduction and removal of said  $\text{AlF}_3$  residue.

9. (New) In a method of affecting cleaning to remove  $\text{AlF}_3$  residue from walls of a reactor chamber, the method comprising the steps of:

igniting a first gas selected from the group consisting of  $\text{H}_2$  and He/ $\text{H}_2$  administered at a flow of about 1000/200 sccm, an RF power of about 750W, and a pressure of about 0.8 Torr; and

administering a second gas selected from the group consisting of  $\text{H}_2$  and Ar/ $\text{H}_2$  at a flow rate of about 500 sccm, an RF power of about 500W, and a pressure of about 0.5 Torr, thereby substantially cleaning the  $\text{AlF}_3$  residue.

10. (New) A method of cleaning a chamber, the method comprising:
- determining cleaning process conditions that maximizes H atom concentration in the chamber;
- injecting into the chamber a first plasma mixture in accordance with striking process conditions;
- striking the first plasma mixture; and
- injecting into the chamber a second plasma mixture in accordance with the cleaning process conditions,
- wherein the cleaning process conditions are different than the striking process conditions.
11. (New) The method of claim 10, wherein the cleaning process conditions includes one or more of a flow rate, a pressure, and an RF power.
12. (New) The method of claim 10, wherein the step of striking a first plasma mixture is performed at a flow rate of about 1,000/200 sccm, at a pressure of about 0.8 Torr, and at an RF power of about 750 W for about 5 seconds.
13. (New) The method of claim 10, wherein the chamber remains closed.
14. (New) The method of claim 10, wherein the cleaning process conditions are determined to be a flow rate of about 500 sccm, an RF power of about 500 W, and a pressure of about 0.5 Torr.

15. (New) The method of claim 10, wherein the step of determining cleaning process conditions is performed by using optical emission spectroscopy with an Ar tracer to determine the H atom concentration, the H atom concentration being determined by the formula:

$$\frac{\text{intensity of H}}{\text{intensity of Ar}} \sim \text{H atom concentration.}$$

16. (New) The method of claim 10 wherein the first plasma is selected from the group consisting of H<sub>2</sub> and He/H<sub>2</sub>.

17. (New) The method of claim 10 wherein the first plasma is selected from the group consisting of H<sub>2</sub> and Ar/H<sub>2</sub>.